

Breakfast Fuels Learning

This is a summary of recent research findings which document the relationship of breakfast to children's health and learning. These summaries could be used: to convince school decision makers to support a breakfast program, for administrators to use as a starting point to research the benefits of breakfast, or they can be included in the school newsletters sent to parents. The summaries may also be used to provide sound information about the breakfast program to the news media and for soliciting support for breakfast programs from various stakeholder groups, such as the PTA.



- To familiarize targeted groups with documented research about the importance of the breakfast program



Target Audience

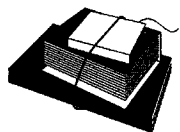
School administrators, food service staff, teachers, news media, parents, and community



Time

Lesson time: 10 minutes to contact appropriate audience and provide information

Preparation time: 30-45 minutes to review the findings and select those appropriate to your situation



Materials

Prepare as handouts or copy and mark selected research you want the audience to grasp



Script

Develop your own as needed

Documentation on the Impact of Breakfast on Health and Learning

Use this reference table to find research that supports the messages that you want to convey to promote school breakfast programs. Reference numbers refer to the articles that support the particular topic or research outcome.

| Topic | Reference Number |
|----------------------------|-----------------------------|
| Policy or Program | 2, 3, 5, 10, 16 |
| Research Outcomes | |
| Cognitive Function | 1, 16, 19, 21 |
| Test Scores | 10, 11, 12, 13, 22 |
| Attendance and Tardiness | 4, 11, 12, 13 |
| Program Participation | 4, 11, 12 |
| Nurse Visits | 11 |
| Behavior related to SBP | 8, 11, 13 |
| Behavior related to hunger | 8, 9 |
| Nutrient Intakes | 4, 6, 7, 14, 15, 19, 20, 22 |
| Relationship to Learning | 3, 5, 10, 16, 17, 18 |
| Universal Programs | 4, 10, 11, 13 |

The Truth Behind the Claims: Documentation on the Impact of Breakfast on Learning and Health

1. Benton D and Parker PY. ***Breakfast, Blood Glucose, and Cognition.*** *American Journal of Clinical Nutrition.* 1998;67(4)(Suppl):772S-778S.

The findings of three studies that explored the role of increased blood glucose in improving memory function for subjects who ate breakfast were examined. Morning fasting was found to adversely affect the ability to recall a word list and a story read aloud, as well as recall items while counting backwards. It was concluded that breakfast consumption preferentially influences tasks requiring aspects of memory.

2. Center on Hunger, Poverty and Nutrition Policy. ***Statement on the Link Between Nutrition and Cognitive Development in Children.*** Center on Hunger, Poverty and Nutrition Policy, 1998. Tufts University, Medford, MA.

This report summarizes research data on the effects of nutrition and the environmental factors associated with poverty on cognitive functions. The report highlights public programs that support poor families. The benefits of child nutrition programs such as WIC, School Breakfast, School Lunch, Summer Food Service, Food Stamps, and the Child and Adult Care Food Programs, based on scientific research, are also described.

3. California Department of Education. ***Eat Well, Learn Well.*** California Department of Education, 1995, Sacramento, CA.

This document highlights the importance nutrition plays in preparing children to learn. It provides a conceptual model for the nutrition services component of a comprehensive school health system. It provides practical ideas and helpful resources for achieving program goals.

4. Cook JT, Ohri-Vachaspati P, Kelly GL. ***Evaluation of a Universally-Free School Breakfast Program Demonstration Project, Central Falls, Rhode Island.*** Center on Hunger, Poverty and Nutrition Policy, 1996, Tufts University, Medford, MA.

This study assessed the impact of a Universally-Free School Breakfast Program, implemented in Central Falls, Rhode Island, on four key areas: 1) school breakfast participation; 2) overall breakfast consumption; 3) nutritional intakes at breakfast; and 4) school absence and tardy rates. Compared to pre-k through sixth grade students in the control schools, the Universally-Free program led to a significant increase in school breakfast participation, especially among at-risk children, and reduced the number of children who started school without breakfast. Children who participated had lower rates of absence and tardiness, and had greater nutrient intakes. These results suggest that a Universally-Free School Breakfast Program is an effective method for increasing school breakfast participation, thus improving the nutritional well-being and educational readiness of school-age children.

5. Doris, Derelian. **Better Breakfast, Better Learning.** California Department of Education and Washington State Office of Superintendent of Public Instruction. 1994. California Department of Education, Sacramento, CA.

This report summarizes the relationship of hunger and classroom performance. As the time between meals increases, concentration suffers. School breakfast energizes students to do their best academically. An action plan for school personnel to support School Breakfast Programs is included.

6. Friedman BJ and Hurd-Crixell SL. **Nutrient Intake of Children Eating School Breakfast.** *Journal of the American Dietetic Association.* 1999;99(2):219-221.

This study evaluated the nutrient intake of children eating school breakfast by assessing actual breakfast consumption of 306 students, aged five to 12 years, over a eight-day period. The results found that actual intake varied significantly from that which was offered. Energy intakes fell below the USDA requirements while saturated fat intakes exceeded the recommendations. Children were able to meet the recommended levels of iron and vitamin C, but fell short for calcium and vitamin A. This analysis suggests that continued evaluation and redesign of school menus are required to help children meet the USDA dietary guidelines.

7. Gordon AR and McKinney P. **Sources of Nutrients in Students' Diets.** *American Journal of Clinical Nutrition.* 1995;61(1S):232S-240S.

This study describes foods consumed and nutrients derived from specific foods by participants and non-participants in the National School Lunch Program (NSLP) and the School Breakfast Program (SBP). Data were derived from 24-hour dietary recalls of 3,350 children in grades 1-12, collected as part of the School Nutrition Dietary Assessment Study. SBP participants were more likely than non-participants to consume milk and fruit juice, leading to higher intakes of calcium and magnesium, and they were three times more likely to eat meat, leading to high intakes of fat and sodium. Results suggest that the school meals can improve a child's nutrient intakes, but that care must be taken to prepare meals that do not exceed the dietary guidelines for fat and sodium.

8. Grantham-McGregor S, Chang S and Walker S. **Evaluation of School Feeding Programs: Some Jamaican Examples.** *American Journal of Clinical Nutrition.* 1998;67:(4)785S-789S.

Two Jamaican studies showed that providing breakfast to students at school improved some cognitive functions, particularly in undernourished children. However, changes in classroom behavior depended upon the quality of the school. Children in better organized schools were able to concentrate more than those in poorly organized schools. Well-designed, randomized, controlled, long-term trials are essential for determining public policy on the implementation of school feeding programs.

9. Kleinman RE, Murphy JM, Little M, Pagano M, Wehler CA, Regal K and Jellinek MS. **Hunger in Children in the United States: Potential Behavioral and Emotional Correlates.** *Pediatrics.* 1998;101(1):E3.

Based on the results from the Community Childhood Hunger Identification Project (CCHIP), an estimated four million American children experience prolonged periodic food insufficiency and hunger each year, representing eight percent of the children under the age of 12 in this country. This study examined the relationship between hunger and psychosocial functions among low-income, school-aged children. A total of 328 parents and children from one CCHIP location completed a Pediatric Symptom Checklist, along with eight food-insufficiency questions which were used to classify children as hungry, at-risk for hunger, or not hungry. Analysis showed that virtually all behavioral, emotional and academic problems were more prevalent in hungry children. Aggression and anxiety had the strongest degree of association with hunger. Greater awareness of the role of food insufficiency and hunger on psychosocial dysfunction in children is needed.

10. Marcotte, LP. **A Guide to Universal Free School Breakfast Programs.** Center on Hunger and Poverty, 1999, Tufts University, Medford, MA.

This report summarizes the benefits of school breakfast, and focuses on universal school breakfast programs as a specific method for increasing participation and improving academic performance of students. Guidance is provided for school administrators who are interested in starting such a program; options, including USDA Provisions, are described; and suggestions for promotional activities are included.

11. Minnesota Department of Children Families and Learning. **School Breakfast Programs Energizing the Classroom.** Minnesota Department of Children Families and Learning, 1998, Roseville, MN.

The outcomes of a three-year Universal School Breakfast Program (SBP) pilot study, which took place in six Minnesota elementary schools, are summarized in this report. This pilot program demonstrated the cognitive, behavioral and general health benefits of serving breakfast to all students as part of the education day. When breakfast was offered at no charge to all students as part of the educational day, participation rates increased significantly. The program appears to play a role in student achievement with a demonstrated general increase in composite math and reading scores. The study showed that providing universal breakfast as part of the school day improved student behavior, reduced morning trips to the nurse, and increased student attendance and test scores. These effects earned the support of teachers, school nurses and school administrators.

12. Meyers AF, Sampson AE, Weitzman M, Rogers BL and Kayne H. **School Breakfast Program and School Performance.** *American Journal of Diseases of Children.* 1989;143:1234-39.

This landmark study examined the effects of school breakfast on academic performance among 1,023 low-income third through fifth grade students. Compared to children who did not have access to the School Breakfast Program (SBP), children who participated in the program had significantly greater gains on overall standardized test scores, and showed improvements in math, reading, and vocabulary scores. In addition, rates of absence and tardiness were reduced among participants. These findings suggest that the SBP is positively associated with significant improvements in academic performance.

13. **Murphy JM, Pagano ME, Nachmani J, Sperling P, Kane S, and Kleinman RE. *The Relationship of School Breakfast to Psychosocial and Academic Functioning.* Archives of Pediatrics and Adolescent Medicine. 1998;152:899-907.**

The effects of a Universal School Breakfast Program (SBP) on school breakfast participation, child behavior, school attendance and punctuality, and academic performance were evaluated in three schools in the Baltimore and Philadelphia school districts. Evaluations were made prior to, and four months after implementation of the universal programs. Based on 133 students with pre and post data available, those who increased participation (42%) had significant improvements in math grades, and lower rates of absence and tardiness. Among the 85 students with psychosocial rating before and after the start of the Universal School Breakfast Program, teachers noted a decrease in problems by students who frequently participated in school breakfast. The results suggest that greater participation in the SBP is associated with improved academic performance and behavior.

14. **Nicklas TA, Weihang B, Webber LS and Berenson GS. *Breakfast Consumption Affects Adequacy of Total Daily Intake in Children.* Journal of the American Dietetic Association. 1993;93:886-891.**

Breakfast consumption patterns were assessed for 467 ten year-old children who were interviewed in the 1984-1985 or 1987-1988 school year. Consumption patterns were then related to average daily nutrient intake patterns. More white children and girls ate breakfast at home, whereas, more black children and boys ate breakfast at school. Results indicated that 16 percent of all children skipped breakfast. Breakfast consumption made a significant contribution to the child's average daily nutrient intake. The average total energy intake was significantly lower for children who either skipped breakfast or who consumed breakfast at home, than for children who ate at school. Children who did not eat breakfast were not able to make up for the lack of nutrients at other meals. These results confirm the importance of breakfast to overall diet quality and adequacy in school-age children.

15. **Nicklas TA, O'Neil CE and Berenson GS. *Nutrient Contribution of Breakfast, Secular Trends, and the Role of Ready-to-Eat Cereals: a Review of the Data from the Bogalusa Heart Study.* American Journal of Clinical Nutrition. 1998;67(4)(Suppl):757S-763S.**

The Bogalusa Heart Study is an ongoing study of the cardiovascular risk factors among children and young adults in Bogalusa, LA. This evaluation studied 1254 ten year-old children over a 15-year period (1973 to 1998). Nutrient intake was assessed by 24-hour dietary recalls. During the first six years of the study, the number of children skipping breakfast increased; but this number was reduced after a school breakfast program started. Children eating breakfast had greater intakes of energy, protein, and carbohydrate, while the percentage of energy from fat decreased. Fewer school breakfast participants fell below the recommended dietary allowance for vitamins A and D, riboflavin, thiamin, calcium, magnesium, and zinc than the children who ate breakfast at home. Nutrient intakes also improved with the consumption of ready-to-eat cereals, which subsequently improved milk intakes. This evaluation supports the important role of the SBP on the nutritional status of school-aged children.

16. Pollitt E and Matthews R. **Breakfast and Cognition: An Integrative Summary.** *American Journal of Clinical Nutrition.* 1998;(67)(4)(Suppl):804S-813S.

The papers presented at the International Symposium on Breakfast and Performance in Napa, CA in 1995 are summarized and integrated with data published since that time. The pooled data suggest that omitting breakfast interferes with cognition and learning, an effect that is more pronounced in nutritionally at-risk children than in well-nourished children. At the very least, breakfast consumption improves school attendance and enhances the quality of student's diets.

17. Pollitt E. **Does Breakfast Make a Difference in School?** *Journal of the American Dietetic Association.* 1995;95(10):1134-39.

This review article describes studies published after 1978 that tested the effects of breakfast on cognitive function and school performance on well-nourished and nutritionally at-risk children. An overnight and morning fast had adverse effects on cognition in at-risk children, particularly limiting the ability to quickly retrieve information in memory. Contradictions in the different studies prevent definitive conclusions on whether or not well-nourished children experience similar functional deficits. The available data suggest that brain function is sensitive to short-term variations in the availability of nutrient supplies, which influence cognition. Well-conducted evaluations suggest that the availability of feeding programs in public schools throughout the academic year increases the probability that children will eat breakfast and improve their educational status.

18. Pollitt E, Cueto S and Jacoby ER. **Fasting and Cognition in Well- and Undernourished Schoolchildren: a Review of Three Experimental Studies.** *American Journal of Clinical Nutrition.* 1998;67(4)(Suppl):779S-784S.

This paper reviews three experiments on the effects of an overnight and morning fast on attention and memory processes among 9 to 11 year-old children. The consequences of fasting, particularly among children who were nutritionally at-risk, included slower stimulus discrimination, increased errors, and slower memory recall. Researchers proposed that these alterations may result from a state of metabolic stress in which the body works to maintain blood sugar concentrations.

19. Pollitt E, Jacoby E and Cueto S. **School Breakfast and Cognition Among Nutritionally At-risk Children in the Peruvian Andes.** *Nutrition Reviews.* 1996;54(4):S22-S26.

In 1993, the government of Peru launched a School Breakfast Program in five Andean departments. Two studies were done to assess the educational and nutritional impact of the School Breakfast Program. The first tested the effects of breakfast on cognition among 54 elementary schoolchildren (ages 9 to 11 years) who were either well nourished or nutritionally at risk. The second study was a field evaluation of the feeding program in 10 rural schools. Based on the evidence presented in both the experimental study and the field evaluation of the National School Breakfast Program in Peru, it was concluded that the brain is sensitive to drops in the short-term availability of nutrients, and that an overnight and morning fast produces a physiological state accompanied by change in brain function, particularly working memory. This is particularly true among nutritionally at-risk children.

20. Siega-Riz AM, Popkin BM and Carson T. Trends in Breakfast Consumption for Children in the United States from 1965 to 1991. American Journal of Clinical Nutrition. 1998;67(4)(Suppl):748S-756S.

Breakfast consumption patterns and trends between 1965 and 1991 were examined for children and adolescents in the United States using data from the Nationwide Food Consumption Surveys from 1965 through 1978, and the Continuing Surveys of Food Intakes by Individuals, 1989 to 1991. Breakfast consumption has declined, but this does not appear to be related to socio-demographic patterns. The nutritional quality of breakfast has improved since 1965, but is offset by the large proportion of adolescents (30 percent) who skip breakfast. Since obesity is associated with less frequent breakfast consumption, a renewed emphasis on the importance of breakfast is warranted.

21. Vaisman N, Voet H, Aklonis A and Vakil E. Effect of Breakfast Timing on the Cognitive Functions of Elementary School Students. Archives of Pediatric and Adolescent Medicine. 1996;150:1089-1092.

The effects of breakfast timing on selected cognitive functions of 569 elementary school students were examined. Routinely eating breakfast two hours prior to being tested does not improve cognitive functions in 11-13 year-old elementary school students, but food supplementation 30 minutes prior to taking a test notably improved scoring.

22. Wyon D, Abrahamsson L, Jartelius M and Fletcher R. An Experimental Study of the Effects of Energy Intake at Breakfast on the Test Performance of 10 Year-old Children in School. International Journal of Food Science and Nutrition. 1997;48 (1):5-12.

The research involved 166 ten year-old school children who were randomly assigned to eat a high or low energy breakfast at home on different days. Those who ate the complete cereal breakfast made fewer mistakes and worked faster in addition and number checking tests. Significant improvements were also observed in the children's creativity and voluntary physical endurance.